

# JAPAN

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JIS Z 4808 (2002) (English): Glove box for handling of radioactive substance

ISO INSIDE

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*The citizens of a nation must honor the laws of the land.*

Fukuzawa Yukichi

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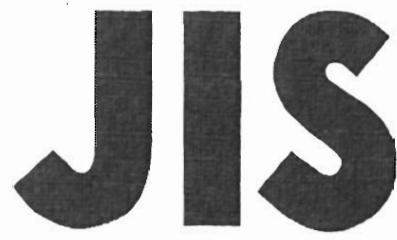


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JAPANESE  
INDUSTRIAL  
STANDARD

Translated and Published by  
Japanese Standards Association

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JIS Z 4808 : 2002

Glove box for handling of  
radioactive substance

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ICS 13.280; 27.120.30

Reference number : JIS Z 4808 : 2002 (E)

**Foreword**

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law. Consequently, **JIS Z 4808 : 1975** is replaced with **JIS Z 4808 : 2002**.

Date of Establishment: 1960-05-01

Date of Revision: 2002-04-20

Date of Public Notice in Official Gazette: 2002-04-22

Investigated by: Japanese Industrial Standards Committee  
Standards Board  
Technical Committee on Protective  
Equipment for Occupational Safety

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JIS Z 4808:2002, First English edition published in 2003-08

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Translated and published by: Japanese Standards Association  
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN

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In the event of any doubts arising as to the contents,  
the original JIS is to be the final authority.

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Printed in Japan

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## Glove box for handling of radioactive substance

**Introduction** This Japanese Industrial Standard has been prepared based on ISO 10648-2 *Containment enclosures—Part 2 : Classification according to leak tightness and associated checking methods* issued in 1994 with modifying some part of the technical contents.

Portions sidelined or underlined with dots are the matters which the original International Standard is modified. A list of modification is given in Annex with explanations.

**1 Scope** This Standard specifies the glove box used for confining the radioactive substance for the protection of operators and working environment in a business place wherein the radioactive substances are treated.

Remarks : The International Standard corresponding to this Standard is as follows.

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to ISO/IEC Guide 21.

ISO 10648-2 : 1994 *Containment enclosures—Part 2 : Classification according to leak tightness and associated checking methods* (MOD)

**2 Normative references** The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. The most recent edition of the standards (including amendments) indicated below shall be applied.

JIS Z 4001 *Glossary of terms used in nuclear energy*

JIS Z 4812 *HEPA filters for radioactive aerosols*

JIS Z 4820 *Test method for leakage of glove boxes*

**3 Definitions** For the main terms used in this Standard, the definitions in **JIS Z 4001** and the following apply.

- a) **glove box for handling of radioactive substance** A box-type apparatus to which a window, a glove and others are fitted so that radioactive substance can be treated in an isolated state to prevent radioactive contamination and radiation exposure.
- b) **radioactive substance** Radioactive isotope and nuclear fuel material and those contaminated therewith.
- c) **leak rate** It express the airtightness of a glove box quantitatively, which means the rate wherein air in the glove box leaks per time.

- d) **negative pressure** A pressure state wherein a pressure in the glove box is lower than the ambient pressure.
- e) **exhaust capacity** Capacity for exhausting the inside of a glove box.

**4 Type and class** The types and classes of glove boxes are shown in Table 1 and Table 2.

**Table 1 Type of glove box**

Type	Form	Remarks
Type 1	Exhaust system packaged type	An exhaust system is affixed to the glove box main body
Type 2	Exhaust system separated type	Those except type 1

**Table 2 Class of glove box**

Class	Leak rate	Remarks
Class 1	$\leq 0.25$ vol %/h	A glove box treating a great amount of radioactive substance
Class 2	$\leq 1.0$ vol %/h	A glove box treating a medium amount of radioactive substance
Class 3	$\leq 10$ vol %/h	A glove box treating a small amount of radioactive substance

**5 Performance** A glove box shall have the following performances.

**5.1 Air leakage** When tested by 8.3, the leakage rate given in Table 2 shall be satisfied according to the class.

**5.2 Exhaust capacity** When tested by 8.4, the exhaust capacity of a glove box shall satisfy the following requirements.

- a) A gas volume necessary for keeping  $\geq 0.5$  m/s of passing wind velocity at an opening part when one glove port is opened.
- b) A gas volume necessary for keeping a specific temperature or lower by cooling down the heat generated from the equipment and the like inside the glove box.
- c) A gas volume necessary for keeping a specific concentration or lower by diluting hazardous gas and particles generated inside the glove box.

**5.3 Electrical insulating resistance** The insulation of electric parts used for a glove box, when tested in accordance with 8.5 shall be  $\geq 5$  MΩ.

**6 Material** Materials used for respective parts of a glove box shall have corrosion resistance and the parts contacting radioactive substance shall be materials of good decontaminability. Materials for principal components shall be as follows.

**6.1 Main body** Stainless steel shall be used for the main body. When corrosion resistance is required, synthetic resin or synthetic resin coated stainless steel may be used.

**6.2 Window plate** Synthetic resin or glass having sufficient transparency and strength shall be used as a window plate.

**6.3 Gasket** As the gasket of an airtight holding parts between the window plate and the main body, the glove port and the window plate, the connector and the main body, the glove box and the main body and the like, materials of chloroprene rubber and the like shall be used according to the practical environment.

**6.4 Glove** As a glove, materials of chloroprene rubber, chlorosulfonatedpolyethylene, butyl rubber or ethylene-propylene shall be used according to the practical environment.

**6.5 Glove port** As a glove port, synthetic resin, aluminium or stainless steel shall be used.

**7 Structure in general** The shape of a glove box is exemplified in Fig. 1. While inside of the glove box is observed under a state wherein radioactive substances are enclosed, an operator can operate the radioactive substances or internal equipment. It shall be so constructed and process finished as to be easily decontaminated, when the inside of glove box is contaminated by radioactive substances. As a rule, the apparatus and parts as given in **7.2** to **7.16** shall be equipped in the glove box.

**7.1 Main body** The glove box shall be a shell-structured or frame-structure. The former is applied to a small glove box and the latter is applied to a medium to large glove boxes.

**7.1.1 Basic shape** The shape of a glove box shall be about integral multiples of 0.5 m for height and width. Depth is about 1 m in the case of both-faced operation and about 0.7 m in the case of side-faced operation.

**7.1.2 Corner part** The bent part and the corner part of each side inside a glove box shall be shaped for easy decontamination and shall have smooth surfaces.

**7.1.3 Earthquake-proof property** A glove box shall have a structure capable of sufficiently durable seismical power estimated based on required antiseismical design.

**7.2 Air supply and exhaust opening** An air supply opening and an air exhaust opening which have a high performance air filter shall be provided to a glove box main body.

**7.3 High performance air filter** A high performance air filter which is fitted to the air supply opening and the air exhaust opening of a glove box shall conform to the performance specified in clause 4 of **JIS Z 4812**.

**7.4 Window plate** A window plate shall have a shape capable of easily securing airtightness by being fixed to a glove box by a method which is free from bad influence of a pressing force due to an outer force.

**7.5 Glove port** For a glove port, necessary number of glove ports shall be fitted to a glove box main body or to a window plate in order to perform a test, maintenance of instrument and others.

**7.6 Glove** The length of a glove shall be a length which is free from hindrance for operation inside the glove box and it shall have five fingers.

**7.7 Frame** A frame shall have an appropriate height so that a glove can be easily operated.

**7.8 Carrying out and taking in opening** Carrying out and taking in opening shall have a size suitable for taking in instruments and carrying out contaminants and shall be so structured to be capable of being operated while airtightness is kept.

**7.9 Exhaust system** An exhaust system shall have a structure wherein an electric motor is not directly exposed to the exhaust. In order to maintain a negative pressure in the glove box always within a specific range, a mechanism such as a back draft damper and the like shall be provided as occasion demands.

**7.10 Connector** A connector for relaying the electric power and the electric signal to the instrument shall have a structure capable of keeping an airtightness and shall be provided to the glove box main body as occasion demands.

**7.11 Utility pipe arrangement** For the utility pipe arrangement of water, chemicals, compressed air and the like, valves shall be provided near the connection part of the glove box main body.

**7.12 Lighting system** In order to operate in a glove box, a lighting system of an appropriate illuminance for operation shall be installed by a structure which is free from disturbance against the operation.

**7.13 Plug receptacle and switch** A plug receptacle and a switch shall be equipped inside and outside a glove box as occasion demands.

**7.14 Indicator** A differential pressure gauge for indicating a pressure difference between inside and outside a glove box shall be provided. A thermometer shall be provided as occasion demands.

**7.15 Shielding body** A shielding body shall be provided as occasion demands according to 1 cm dose equivalent rate of working environment caused by radioactive substance in a glove box.

**7.16 Quenching devices** In case where fire may be occurred in a glove box, a quenching device shall be installed.

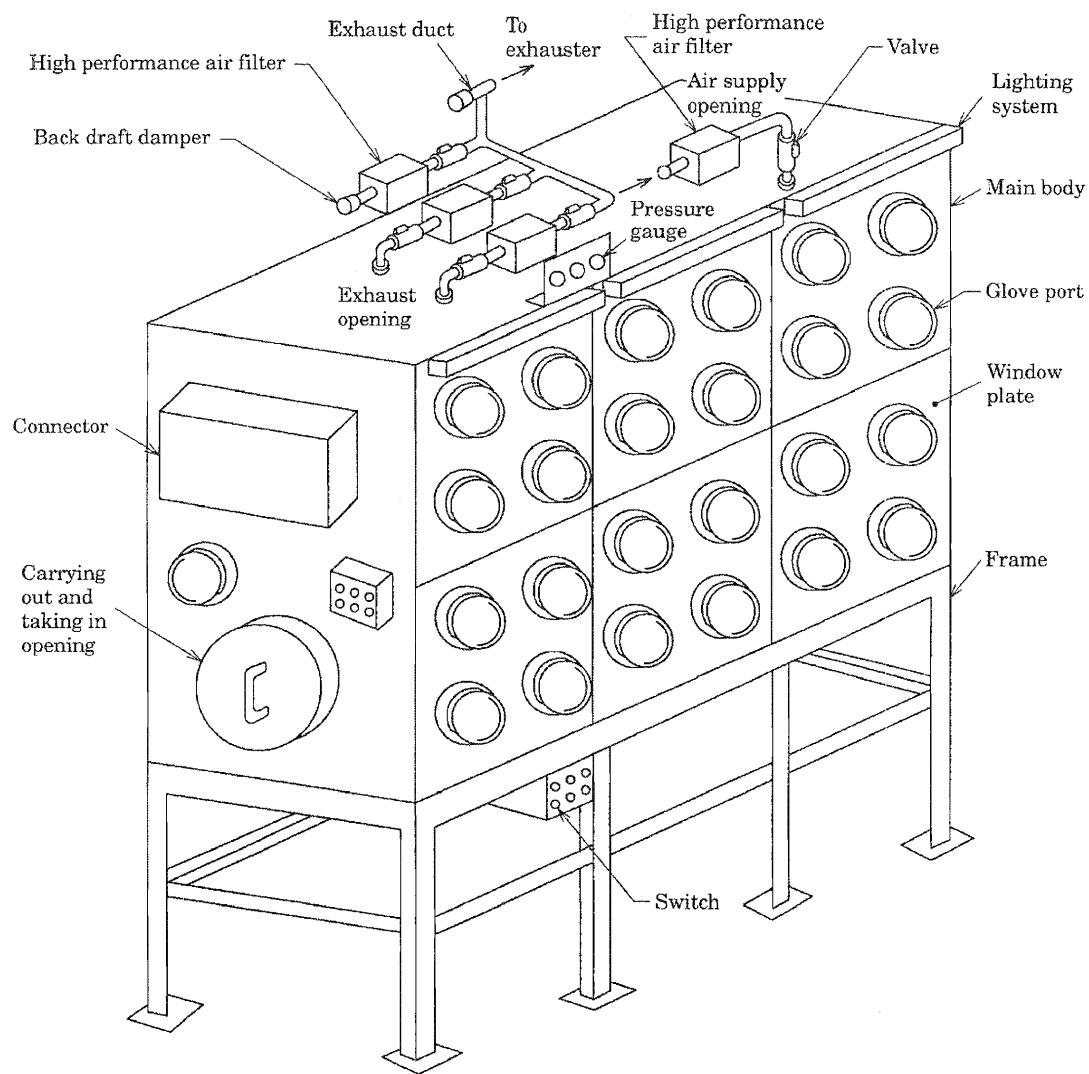


Fig. 1 Example of a glove box of simple shape

## 8 Tests

**8.1 Test items** Test items according to the type of a glove box shall be as shown in Table 3.

**Table 3 Test**

Test item	Type and class of glove box					
	Type 1			Type 2		
	Class 1	Class 2	Class 3	Class 1	Class 2	Class 3
Structure test	○	○	○	○	○	○
Air leakage test	○	○	○	○	○	○
Exhaust capacity test	○	○	○	—	—	—
Electrical insulation test	○	○	○	○	○	○

Remarks : The mark ○ indicates items to be executed.

**8.2 Structure test** Whether or not requirements specified in clause 7 conform to, shall be examined.

**8.3 Air leakage test** An air leakage test shall be tested in accordance with **JIS Z 4820**.

**8.4 Exhaust capacity test** A glove box is made in a practical state, a flow rate is measured with a flow metre with calibrated appropriate precision, and whether or not requirements specified in **5.2 a) to c)** conform to, shall be examined.

**8.5 Electrical insulating resistance test** Insulating resistance between the live part and the dead metallic part is measured with a calibrated 500 V insulation resistance metre and whether or not requirements specified in **5.3** conform to, shall be examined.

**9 Inspection** For the inspection, the following items are tested in accordance with clause 8 and that conformed to clauses 5 and 7 shall be accepted. On the test records, they shall be always capable of being indicated as quality guarantee records.

- a) Structure
- b) Air leakage (indicate by leak rate)
- c) Exhaust capacity
- d) Electrical insulating resistance

**10 Designation of products** Products shall be designated by the type and the class.

An exhauster integral type is called  
type 1 class 1, type 1 class 2 and type 1 class 3.

An exhauster separated type is called  
type 2 class 1, type 2 class 2 and type 2 class 3.

**11 Marking** The glove box shall be marked with the following items at a conspicuous place by means to be indelible.

- a) Name or No. of instrument
- b) Type and class
- c) Year and month of manufacture
- d) manufacturing No.
- e) Manufacturer's name or abbreviation
- f) Alarm label

**12 Instructions for use** Instructions for use on which the following items are recorded shall be attached to the glove box so that an operator can operate safely.

- a) Manufacturing purpose and use
- b) Cautions on handling
- c) Cautions on installation
- d) Safe treating method
- e) Points on maintenance and checking

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Related standards :

JIS B 2401 *O-rings*  
JIS B 8330 *Testing methods for turbo-fans*  
JIS B 9908 *Test method of air filter units for ventilation and electric air cleaners for ventilation*  
JIS C 3312 *600 V Grade polyvinyl chloride insulated and sheathed portable power cables*  
JIS C 3327 *600 V Rubber insulated flexible cables*  
JIS C 8303 *Plugs and receptacles for domestic and similar general use*  
JIS C 8304 *Small switches for indoor use*  
JIS C 8370 *Molded case circuit breakers (MCCB)*  
JIS G 4304 *Hot rolled stainless steel plates, sheets and strip*  
JIS G 4305 *Cold rolled stainless steel plates, sheets and strip*  
JIS K 6200 *Rubber—Vocabulary*  
JIS K 6380 *Rubber packing material*  
JIS K 6718-1 *Plastics—Poly (methyl methacrylate) sheets—Types, dimensions and characteristics—Part 1 : Cast sheets*  
JIS K 6718-2 *Plastics—Poly (methyl methacrylate) sheets—Types, dimensions and characteristics—Part 2 : Melt-calendered extruded sheets*  
JIS K 6735 *Plastics—Polycarbonate sheets—Types, dimensions and characteristics*  
JIS K 6745 *Plastics—Unplasticized poly (vinyl chloride) sheets—Types, dimensions and characteristics—Part 1 : Sheets of thickness not less than 1 mm*  
JIS K 6900 *Plastics—Vocabulary*  
JIS R 3205 *Laminated glass*  
JIS R 3206 *Tempered glass*  
JIS Z 3831 *Standard qualification procedure for welding technique of plastics*

**Annex 1 nformative)**

**Comparison table between JIS and corresponding International Standard**

<b>JIS Z 4808:2002 Glove box for handling of radioactive substance</b>				<b>ISO 10648-2 Containment enclosures—Part 2:Classification according to leak tightness and associated checking methods</b>			
(I) Requirements in JIS		(II) International Standard number	(III) Requirements in International Standard		(IV) Classification and details of technical deviation between JIS and the International Standard by clause Location of deviation: text Indication method: dotted underlines or continuous sidelines		(V) Justification for the technical deviation and future measures
Clause	Content		Clause	Content	Classification by clause	Detail of technical deviation	
Introduction							
1 Scope	Glove box for treating radioactive substance	ISO 10648-2	1	Classification of class a leak testing methods (including the leak rate of vacuum force pressure vessel and the like)	MOD/alteration	The range wherein the leak rate is not accepted is different. <b>JIS</b> is $\leq 0.25 \text{ %/h}$ .	<b>ISO</b> specifies $\leq 0.05 \text{ %/h}$ . In Japan, $\leq 0.25 \text{ %/h}$ is accepted as class 1 considering the measuring precision.
2 Normative references	<b>JIS Z 4001</b> <b>JIS Z 4812</b> <b>JIS Z 4820</b>		2	ISO 611:1981 ISO 108-1	MOD/alteration		
3 Definitions	Glove box for handling of radioactive substance, radioactive substance, leak rate, negative pressure and exhaust capacity		3	Glove box and leak rate arlito in <b>JIS</b> .	MOD/alteration	—	

(I) Requirements in <b>JIS</b>		(II) International Standard number	(III) Requirements in International Standard		(IV) Classification and details of technical deviation between <b>JIS</b> and the International Standard by clause Location of deviation: text Indication method: dotted underlines or continuous sidelines		(V) Justification for the technical deviation and future measures
Clause	Content		Clause	Content	Classification by clause	Detail of technical deviation	
4 Type and class	Type of glove box (classified into types 1 and 2), and class (classified into classes 1, 2 and 3)		4	Classes 2, 3 and 4 are ditto in <b>JIS</b> .	MOD/ alteration	The range wherein class 1 is not accepted is different. (To atomic force pressure vessel and the like are specified in ISO). <b>JIS</b> specifies $\leq 0.25\%/\text{h}$ .	In Japan, considering accuracy of instruments and measurement error $\leq 0.25\%/\text{h}$ is accepted as class 1. (In <b>JIS</b> , the glove box is specified.) This class is employed empirically and practically.
5 Performance	Air leakage, exhaust capacity and electrical insulating resistance			Not specified in ISO.	MOD/ addition		
6 Material	Main body, window plate, gasket, glove and glove port			Not specified in ISO.	MOD/ addition		A propose is scheduled to ISO at the appropriate timing.
7 Structure in general	16 items such as main body, air supply and exhaust opening, high performance air filter, window plate, glove port, glove and the like			Not specified in ISO.	MOD/ addition		A propose is scheduled to ISO at the appropriate timing.
8 Tests	Structure test, air leakage test, exhaust capacity test and electrical insulating resistance test		5	Air leakage test is ditto in <b>JIS</b> .	MOD/ addition	Specifications concerning structure test, exhaust capacity test and electrical insulating resistance test are added.	

(I) Requirements in JIS		(II) International Standard number	(III) Requirements in International Standard		(IV) Classification and details of technical deviation between JIS and the International Standard by clause Location of deviation: text Indication method: dotted underlines or continuous sidelines		(V) Justification for the technical deviation and future measures
Clause	Content		Clause	Content	Classification by clause	Detail of technical deviation	
9 Inspection	Structure, air leakage, exhaust capacity and electrical insulating resistance		5	Air leakage test is ditto in JIS.	MOD/ addition	Specifications concerning structure, exhaust capacity and electrical insulating resistance inspections are added.	
10 Designation of products	According to a type and a class			Not specified in ISO.	MOD/ addition		For types, a propose is scheduled to ISO at the appropriate timing.
11 Marking	Name or No. of instrument, type and class, year and month of manufacture, manufacturing No., manufacturer and the like			Not specified in ISO.	MOD/ addition		A propose is scheduled to ISO at the appropriate timing.
12 Instructions for use	Manufacturing purpose and use, cautions on handling, cautions on installation, safe treating method and points on maintenance and checking			Not specified in ISO.	MOD/ addition		A propose is scheduled to ISO at the appropriate timing.

Designated degree of correspondence between JIS and International Standard: MOD



Remarks 1 Symbols in sub-columns of classification by clause in the above table indicate as follows:

- MOD/addition: Adds specification item(s) or content(s) not included in International Standard.
- MOD/alteration: Alters the specification content(s) included in International Standard.

2 Symbol in column of designated degree of correspondence between **JIS** and International Standard in the above table indicates as follows:

- MOD: Modifies International Standard.

Errata for JIS (English edition) are printed in *Standardization Journal*, published monthly by the Japanese Standards Association, and also provided to subscribers of JIS (English edition) in *Monthly Information*.

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